

SOV/119-59-4-7/18

AUTHORS: Foygel', L. A., Engineer, Shekhter, Z. Kh., Engineer,
Elyukim, S. V., Engineer

TITLE: Investigation of the Dependence of the Elastic Properties of
Helical Tubular Springs Upon Geometrical Configuration
(Issledovaniye zavisimosti uprugikh kharakteristik vitykh
trubchatykh pruzhin ot geometricheskikh razmerov)

PERIODICAL: Priborostroyeniye, 1959, Nr 4, pp 15-17 (USSR)

ABSTRACT: The authors investigated the elastic properties of helical
tubular springs as dependent upon the wall thickness and the
pitch. The springs all had the same profile and were made of
stainless steel 4 Kh 13. The methods of measuring the thickness
and the pitch of the springs are discussed. The sensitivity is
defined as the ratio of twisting angle and measured pressure:
 $\alpha = \varphi/P$. In a figure a total view of the device for the measure-
ment of the twisting angle of the springs is presented. This
device cannot only be used for the examination of test springs,
but may also be employed in the checking of mass-produced
springs. More than 100 springs with differing pitch and thick-
ness were tested. In five diagrams the sensitivity versus pitch

Card 1/2

Investigation of the Dependence of the Elastic Properties of Helical Tubular
Springs Upon Geometrical Configuration

SOV/119-59-4-7/18

function is given for constant thickness. The curves all exhibit the same character. It appears that the sensitivity exhibits a maximum for certain pitch. The deviation of the experimental results is much greater than would be expected due to the propagation of the error in measuring the pressure and the twisting angle. It is assumed that it must be ascribed to different wall thickness, to irregular pitch and to certain irregularities in the shape of the spring. The diagrams mentioned provided the information required for a determination of the quantities which must be known for the investigation and the production of springs. The characteristics of such springs are in general non-linear. As yet, not all of the causes for this non-linearity are known, the main origin, however, being considered the dependence of the sensitivity upon the pitch. Finally the degree of non-linearity is calculated under simplifying assumptions. The results of the calculations give a satisfactory agreement with the experimental results. There are 11 figures and 1 table.

Card 2/2

ABWZEYD, M. A.; ANTUF'YEV, Yu. P.; BARANIK, A. T.; EL'-ZAYKI, M. I.; NJER, T. M.;
SOROKIN, P. V.

"Investigations of the Reaction $Al^{27}(d,\alpha)Mg^{25}$ at Deuteron Energies 1.5 - 2.5 MeV. Dependence of the Intensity of Alpha Groups on the Spin of Levels of the Final Nucleus Mg^{25} ."

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22 Feb 64.

KhFTI (Ukrainian Physico Technical Inst, Khar'kov)

"APPROVED FOR RELEASE: Thursday, July 27, 2000

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CIA-RDP86-00513R00041211C

SEIDOV, G., kand.sel'khoz.nauk; EL'ZENGR, T., kand.sel'khoz.nauk;
GLUSHANOVSKAYA, V., red.; NASIROV, N., tekhn. red.

[Cotton irrigation in Azerbaijan] Polivy khlopchatnika v Azer-
baidzhane. Baku, Azerbaidzhanskoe gos.izd-vo, 1960. 44 p.
(MIRA 14:12)
(Azerbaijan--Cotton--Irrigation)

USSR/Cultivated Plants - Commercial. Oil-Bearing. Sugar-Bearing. M

Abs Jour : Ref Zhur Biol., No 18, 1958, 82418

Author : El'zengr, T.A.

Inet : AS Uzbek SSR

Title : On the Periods of Applying Cotton Irrigation in Azerbayd-
zhan SSR

Orig Pub : V sb.: Ref. nauchno-issled. rabot po khlopkovodstvu.
Tashkent, AN UzSSR, 1957, 133-139

Abstract : To secure cotton sprouting in the conditions of Azerbayd-
zhan a pre-planting watering with the norm of 1200-1300
cubic meters/ha is necessary. Such irrigation (together
with the April-June precipitation) fully satisfies the
plant requirement for moisture prior to the start of
mass blossoming and moves the beginning of the first ve-
getative irrigation to the end of June or beginning of

Card 1/2

- 73 -

ELZNIC, Antonin

Northwestern boundary of the Chomutov - Most - Teplice Basin.
Vest Ust geol 38 no.4:245-251 Je '63.

1. Sdruzeni Severoceskyh hnedouhelnych dolu, Banske stavby,
n.p. Osek.

EM, Hans

Vegetation growth over the limestone sand in the valley of Gornja
Radika River. Zemljiste biljka 12 no. 1/3:239-241 Ja-D '63.

1. Faculty of Agriculture and Forestry of the University of
Skopje, Skopje.

EM, P.A., inzh.

Improving properties of silicate pastes with clay admixtures.
Stroi. mat. 5 no.4:28 Ap '59. (MIRA 12:6)
(Silicates)

EM, S.

Effect of novocain electrophoresis of the trigeminal nerve on
trophism of the cornea. Cesk. oft. 9 no.5:415-417 Oct 1953. (OLML 25:5)

1, Of the Eye Department (Head--Stastnik, M.D.) of Ostrava Hospital.

EMAN, A.A.

Device for continuous recording of arterial pressure by an indirect method. Nov. med. tekhn. no.5:58-60 '61.

(MIRA 17:6)

1. Samostoyatel'noye konstruktorskoye tekhnologicheskoye byuro biologicheskogo i fiziologicheskogo priborostroyeniya.

TEREKHOVA, L.G., kand.biolog.nauk (Leningrad, P-136, Lakhtinskaya ul.,
d.25-b, kv.10); EMAN, A.A., inzhener

Surgical polygraph PGKH-01, a new device for the control of
physiological processes during surgical operations, Vest.khir.
87 no.11:16-24 N '61. (MIRA 15:11)

1. Iz samostoyatel'nogo konstruktorskogo tekhnologicheskogo byuro
biologicheskogo i fiziologicheskogo priborostroyeniya (Leningrad).
(SURGICAL INSTRUMENTS AND APPARATUS)

EMAN, B. (Zagreb); TADIO, D. (Zagreb)

On the deviations from the allowed shape in the allowed β -decay spectra. Glas mat fiz Hrv 16 no.1/2:89-120 '61.

1, Institute "Ruder Boskovic", Zagreb.

EMAN, B. (Zagreb); TADIC, D. (Zagreb)

G-nonconserving terms in the beta decay interaction. Glas mat
fiz Hrv 17 no.1/2:81-87 '62 [publ. '63].

ACC NR: AT6033086

SOURCE CODE: UR/1002/66/000/014/0191/0702

AUTHOR: Emar, T. I. (Novosibirsk)

ORG: none

TITLE: Certain mathematical models of biogeocenoses

SOURCE: Problemy kibernetiki, no. 16. Moscow, 1966, 191-202

TOPIC TAGS: biologic ecology, ~~closed ecology system~~, mathematic model, Volterra equation

ABSTRACT: The kinetics of various biogeocenoses is investigated on the basis of I. A. Poleyev's equations. This is considered for a community of the populations of n species of living organisms, where every successive species i in the sequence is a predator with respect to the preceding species $(i-1)$ and a "victim" (food) with respect to the $(i+1)$ -th species. The number of individuals in the population of the i -th species is denoted by x_i . Thus, e. g. we may have the following sequence of "species": vegetation, the herbivora, animals preying on the herbivora, and so on. It is shown that for the Volterra system the stationary point $\{x_{i,0}\}$ exists only for an even-numbered n , whereas for systems in which the nutrient store of the soil and the insolation are taken into account, on assuming that one or both are limited,

Card 1/2

ACC NR: AT6032086

the stationary point exists for any n. Orig. art. has 4 figures, 17 formulas.

SUB CODE: 06, 12 / SUBM DATE: 13Mar66/ ORIG REF: 003/ OTH REF: 001

Card 2/2

EMANOIL, C.

COUNTRY	:	Rumania	H-33
CATEGORY	:	Chemical Technology. Chemical Products and Their Applications--Cellulose and its derivatives. Paper	
ABS. JOUR.	:	RZKhim., No. 16 1959, No.	59358
AUTHOR	:	Emanoil, C.	
TEST.	:	Not given	
TITLE	:	The Full Utilization of Pine Mill Wastes as Industrial Raw Materials	
ORIG. PUB.	:	Ind Lemn, 8, No 1, 9-13 (1959)	
ABSTRACT	:	The author recommends the utilization of the mill wastes for the production of cellulose and of fiberboard. Experiments with the grinding of the wastes directly at the mills are recommended. From author's summary	

CARD: 1/1

BONDAR, Constantin; EMANOIL, Gheorghe

Contributions to the study of the agitation of the Black Sea
on the Rumanian littoral. Studii hidrol 4:89-160 '63.

EMANOVIC, Dubravko; KRIZAJ, Zdravko

Reanimation of a starving and deeply cooled rat. Biol glas 14
no.3/4:155-165 '61.

1. Odjel za fiziologiju Instituta za morfologiju i fiziologiju
Veterinarskog fakulteta u Zagrebu.

MANUSCRIPT, 7.

Resistance welding of small parts. p. 186. ZVARANIE. (ministerstvo
hutneho prumyslu a rudnych bani a Ministerstvo strojarstva) Bratislava.
Vol. 3, no. 6, June 1955.

SOURCE: East European Accessions List, Vol. 5, no. 9, September 1956

EMMANUEL, A.V.

EMMANUEL, A.V.

Role of therapeutic exercise during radon therapy for women with chronic inflammation of the genital organs. Vop.kur.fizioter. i lech.fiz.kul't. 22 no.4:38-41 J1-Ag '57. (MIRA 10:11)

1. Is sanatoriya No.7 kurorta Pyatigorsk (glavnyy vrach - zaslushennykh vrach RSFSR Ye.I.Kiroksova, konsul'tant - kandidat meditsinskikh nauk A.V.Emmanuel')

(GENERATIVE ORGANS, FEMALE--DISEASES)

(EXERCISE THERAPY) (RADON--THERAPEUTIC USE)

EMANUEL', A.V., starshiy nauchnyy sotrudnik

New method for treating dysmenorrhea through iontophoretic introduction of novocaine into the solar plexus. Fed., akush. i gin. 20 no.1:39-41 '58. (MIRA 13:1)

1. Ginekologicheskiy otdel Ryatigorskoy kliniki Pal'neologicheskogo instituta na Kavkazskikh Mineral'nykh Vodakh (direktor - dots. I.S. Savoshchenko).

(MENSTRUATION)

(NOVOCAINE)

EMANUEL', Anna Vasil'yevna

[Treatment of gynecological diseases at mineral water health resorts in the Caucasus] Lechenie zhenskikh boleznei na kurortakh Kavkazskikh mineral'nykh vod. Izd.2., ispr. i dop. Stavropol', Stavropol'skoe knizhnoe izd-vo, 1959. 71 p.

(MIRA 13:8)

(WOMEN--DISEASES)

(CAUCASUS--MINERAL WATERS)

EMANUEL', A.V., starshiy nauchnyy sotrudnik

Effect of vaginal radon irrigations on the vascular and muscular
tonus of the uterus in cats. Uch.zap.Pyat.gos.nauch.-issl.bal'n.
inst. 3:334-352 '60. (MIRA 15:10)
(UTERUS) (RADON--THERAPEUTIC USE) (COLPOSCOPY)

STAVSKAYA, Ye.Ya., prof.; EMANUEL', A.V., starshiy nauchnyy sotrudnik;
ZINKOVETSKAYA, T.S., ordinator; BABAYAN, S.S., klinicheskiy ordinator

Effectiveness of treating inflammatory gynecological diseases of
the female sex organs using radon waters in two concentrations.

Uch.zap.Pyat.gos.nauch.-issl.bal'n.inst. 3:353-364 '60.

(MIRA 15:10)

(PYATIGORSK--RADON--THERAPEUTIC USE)
(GENERATIVE ORGANS, FEMALE--INFLAMMATION)

EMANUEL', A.V., starshiy nauchnyy sotrudnik

Dynamics of the neurovascular reactions according to colposcopy
data in uterine hemorrhages of an inflammatory origin under the
influence of Pyatigorsk radon waters. Uch.zap.Pyat.gos.nauch.-
issl.bal'n.inst. 3:365-374 '60. (MIRA 15:10)
(HEMORRHAGE, UTERINE) (PYATIGORSK--RADON--THERAPEUTIC USE)
(COLPOSCOPY) (UTERUS)

EMANUEL', A.V.

Registration of the results of health resort treatment of gynecological patients and modern criteria for their evaluation. Vop. kur., fizioter' i lech. fiz. kul't. 26 no.3:193-198 My-Je '61.

(MIRA 14:7)

1. Iz sanatoriya "Mashuk" (glavnyy vrach F.D.Stoyanov [deceased]).
(WOMEN—DISEASES) (THERAPEUTICS, PHYSIOLOGICAL)

EMANUEL', A.V.

Treatment of gynecologic patients with subacute inflammatory diseases by radon baths combined with ultraviolet ray erythema therapy. Vop. kur., fizioter. i lech. fiz. kul't. 26 no.4:326-332 J1-Ag '61. (MIRA 15:1)

1. Iz ginekologicheskogo otdeleniya (zav. - A.V.Emanuel') Pyatigorskoy kliniki Bal'neologicheskogo instituta na Kavkazskikh Mineral'nykh Vodakh (dir. - dotsent I.S.Savoshchenko).

(RADON THERAPEUTIC USE) (WOMEN DISEASES)

(ULTRAVIOLET RAYS THERAPEUTIC USE)

RYZHKOV, O.A.; EMANUEL', E.V.; ATAKULOV, T.

Features of the formation of the anticlinal folds of the Surkhan
synclinal zone. Neftegaz. geol. i geofiz. no. 12:23-26 '63.
(MIRA 17:5)

1. Institut geologii i razrabotki neftyanykh i gazovykh
mestorozhdeniy AN UzSSSR.

EMANUEL, L.:PAJDUSAKOVA, L.

One year observations on occupational dermatoses. Cesk. dermat. 27 no.
10:141-120 Dec 1952. (CLML 23:5)

1. Of the Skin Department (Head--E. Emanuel, M.D.) of the State District Hospital in Trenčin.

EMANUEL L.

*Pyodermie pri profesionalnych dermatozach. Pyoderma in occupational skin diseases
BRATISLAVSKÉ LEKÁRS. LISTY 1953, 33/9 (743-748)
From 100 cases of occupational skin diseases pyoderma was present in 25%. Three groups
may be distinguished: (1) Occupational diseases with secondary pyogenic infection.
(2) Pyodermas which induce occupational disease. (3) Occupational diseases with
additional sensitization to pyogenic cocci. Schwank - Prague

SO: Excerpta Medica
Section III
Vol. 9 No. 1

EMANUEL, L., MUDr., primar Trencin.

Present status of the campaign against gonorrhea. Cesk. dermat.
30 no.3:152-156 June 55.

(GONORRHEA, prevention and control
current status)

EMANUEL, L., MUDr.

Experiences with cardiovascular syphilis. Cesk. dermat. 31
no.6:321-329 Dec 56.

1. Klinická základna UDL dermato-vener. odd. v Trenčine.
(SYPHILIS, CARDIOVASCULAR,
(Cs))

EMANUEL, L.
LISA, M., MUDr.; EMANUEL, L., MUDr.

Survey of syphilitic patients at the Trenčin venereological clinic during the recent 5 years. Cesk. dermat. 31 no.6:330-333 Dec 56.

1. Klinická základna UDL, dermato-vener. odd. v. Trenčíne.
(SYPHILIS, statistics,
hosp. report (Cs))

EMANUEL, Ludovit

Experience with aminopterin therapy of psoriasis. Cesk. dermat. 36 no.4:
246-250 Je '61.

1. Dermatovenerologicka katedra SUDL v Trencine.

(AMINOPTERIN ther) (PSORIASIS ther)

EMANUEL, L.

Significance of epidermophytosis according to 2-year observations.
Cesk. dermat. 36 no.6:401-406 '61.

1. Dermatovenerologicka katedra SUDL Trencin.

(RINGWORM epidemiol)

EMANUEL, L'.; CIGVAREK, Z.

Changes in blood proteins in chronic lupus erythematosus during the course of resochin therapy. Cesk. dermat. 36 no.1:21-27 F '62.

1. Dermatovenerologická katedra SUDL v Trenčine, vedúci katedry MUDr.

L. Emanuel a Centrálna biochemické laboratórium OUNZ v Trenčine, vedúci MUDr. Z. Cigvarek.

(BLOOD PROTEINS chem) (LUPUS ERYTHEMATOSUS blood)
(CHLOROQUINE ther)

EMANUEL, L.

CZECHOSLOVAKIA

MD

Department of Dermatology and Venerology of the Slovak Institute
for Postgraduate Medical Training (Dermatovenerologicka katedra
SUDL), Trencin

Head of the Department: L. EMANUEL, MD.

Bratislava, Lekarsky Obzor, No 10, Oct 62, pp 571-578

"Experiences with Griseofulvine Applied in Cases of Dermatomycoses
at the Dermatovenerological Department, Trencin."

EMANUEL, L.; LISA, M.

Our experiences with the TPI test in congenital syphilis. Cesk.
derm. 39 no.62402-406 D '64

1. Dermato-venerologická katedra SUDL v Trenčine (vedoucí MUDr.
L. Emanuel).

EMANUEL, Laszlo, okl. gepeszmernok

Investigations of the stresses occurring at the knocking of the camshaft-controlled oil-pump pistons. Jarmu mezo gep 9 no.1:18-20 Ja '62.

EMANUEL, Laszlo

"Technical handbook of vibrations" by [Dr] Adam Bosznay.
Reviewed by Laszlo Emanuel. Jarmu mezo gep 10 no. 4: 155-157
Ap '63

TSESARSKAYA, S.I., doktor med.nauk; EMANUEL', M.I.; MATLIS, L.Ye., kand.
med.nauk; VAYNSHTOK, V.Z.

Dynamics of the isolation of bacilli in tuberculosis patients
depending on the methods of treatment. Probl. tub. 41 no.10:
37-42 '63. (MIRA 17:9)

1. Iz Odesskogo nauchno-issledovatel'skogo instituta tuberkuleza
(dir. M.A.Brusnikin) i Odesskogo meditsinskogo instituta.

SAPEZHINSKIY, I.I.; EMANUEL', N.M.

Mechanisms underlying the recombination of the radicals of irradiated proteins in the presence of oxygen. Dokl. AN SSSR 165 no.4:845-847 D '65. (MIRA 18:12)

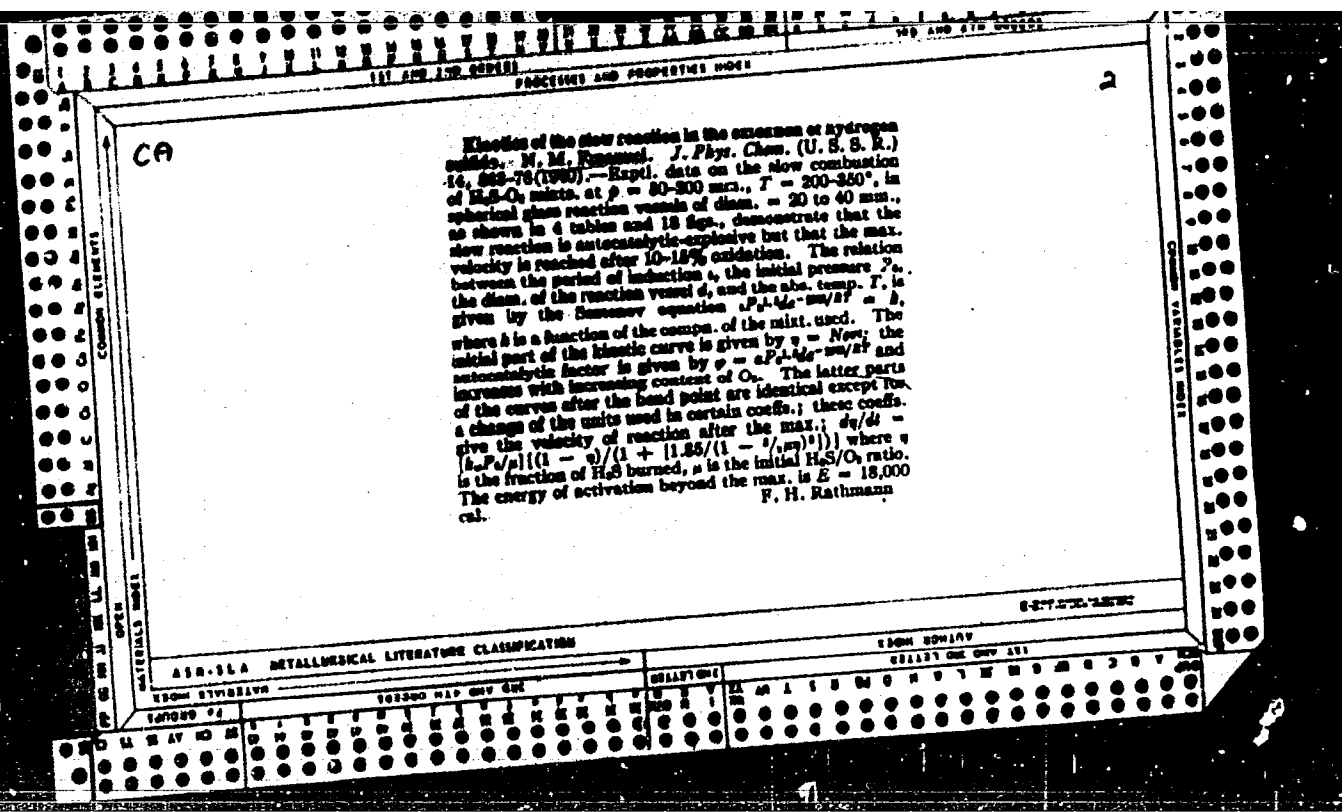
1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Emanuel').

SAPRIN, A.N.; KLOCHKO, E.V.; KRUGLYAKOVA, K.Ye.; CHIBRIKIN, V.M.; EMANUEL', N.M.

Effect of the inhibitors of radical reactions on the kinetics of the change in free radical content in the organs of mice in experimental leukemia. Dokl. AN SSSR 166 no.3:746-748 Ja '66.

(MIRA 19:1)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Emanuel'). Submitted August 27, 1965.



Ca

Kinetic method for the investigation of intermediate products of autocatalytic reactions. N. N. Semenov and N. M. Bessonov. *Compt. rend. acad. sci. U. R. S. S.* 28, 219-23 (1940) (in German).—The oxidation of H_2S was studied at various temps. and pressures by using mixts. of H_2S and O in a reaction vessel having 3 sep. chambers so that after holding the mixt. in one under definite conditions for a time it could be transferred to the next and held under different conditions while the induction period of the reaction was detd. The longer the mixt. was held in the first chamber, the shorter the induction period in the second. To show that the intermediate products are stable for some time under various conditions the contents of the first chamber were held at various conditions before going into the indicator chamber and still the induction period was shortened. By adding fresh mixts. of the two gases to material in various stages of induction and detg. the induction period some values for the concn. of the intermediate products were obtained. Activation energy was calcd. from the expts. as $E = 8500$ cal./mol. O. E. S.

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1ST AND 2ND ORDERS PROCESSES AND PROPERTIES INDEX

3

C A

SO as an intermediate product of the oxidation reaction of hydrogen sulfide. N. M. Korman, D. S. Pavlov and N. N. Semenov. *Compt. rend. acad. sci. U. R. S. S.* 28. 618-20 (1940) (in English).—The absorption spectra of a reaction mixt. of H_2S and O_2 at 270° and 100 mm. pressure indicate strong bands of SO (or S_2O) for the reaction interval of 3 min., which includes an induction period of 27 sec. followed by a slow combustion up to 40% reaction, where the results become obscured. This result is in good agreement with the kinetic theory of Semenov (C. J. 30, 1112), and the relative band intensities check with considerations of lifetime temp. coeff. of decay of intermediate products. The elementary reaction is exothermic: $H_2S + O_2 = H_2O + SO + 44,000$ cal. The velocity max. corresponds to 10-15% combustion. S. R. Korman

ADDITIONAL LITERATURE CLASSIFICATION

ADDITIONAL LITERATURE CLASSIFICATION

ADDITIONAL LITERATURE CLASSIFICATION

Reaction of sulfur monoxide with water. N. M. Emanuel (*Dokl. Akad. Sci. U.S.S.R., Chem. Sci. Ed.*, 1942, 281-283).—The kinetics of the reaction of SO (produced by the oxidation of H₂S) with H₂O, in the temp. range 6–80° and at H₂O pressures of 3–30 mm. Hg, have been studied. The reaction has a negative temp. coeff. and is unaffected by an increase in the surface area of the vessel. It is termol., viz., $SO + S_2O_3 + H_2O = H_2S + SO_2$. V. H.

New kinetic effect. N. M. Emanuel (*Compt. rend. Acad. Sci. U.S.S.R.*, 1942, 88, 850-854).—The effect of pretreatment of H₂S-O₂ mixtures on the flash within the region of ignition and on the kinetics near the region has been investigated. The flash operation replaces the indicator bulb as a means of investigating the kinetics of a slow reaction and is extended to the study of the kinetics of the intermediate products. It is shown that max. (SO) is attained at 780–880° and that (SO) is independent of initial pressure but α pressure displacement as a result of pretreatment. C. R. F.

Sulfur monoxide. N. M. Emanuel (*Compt. rend. Acad. Sci. U.S.S.R.*, 1942, 88, 168-169).—The part played by SO as an intermediate in the oxidation of H₂S has been studied by examination of the influence of synthetic SO on the induction period of the reaction and on the explosion limits. Results confirm the view previously advanced by the author from the absorption spectra data (A., 1941, 1, 217) that SO is the chief active intermediate product in the oxidation reaction. J. O'M.R.

STANDARD FORM NO. 1

PROJECT AND PROPOSED MODEL

2

Forward kinetics of slow oxidation of hydrogen outside. N. M. ... *Adv. Phys. Chem.* 10, 240-274 (1964). The rate of the reaction was followed by pressure change in a conventional glass static system fitted with a membrane-type manometer. The temp. was varied from 240 to 300°, the pressure from 50 to 250 mm., and H₂:O₂ ratios of 1:1, 1:2, and 2:1 were used. The reaction is $H_2 + 1.5O_2 \rightarrow H_2O + 0.5O$. After an induction period, the rate of pressure drop gradually increased to a max., which occurred when the reaction was only 10-15% complete; the reaction dropped slowly. At the end of the induction period, a slight momentary rise in pressure was occasionally seen, too large to be accounted for as a purely thermal effect, but this was not reproducible. The induction periods τ followed the law $\tau/P_0^{1/2} = \text{const.}$, where P_0 is initial pressure and d the diam. of the cylindrical reaction vessel. The accelerating portion of the reaction (before the rate max.) was governed by the exponential law $n = Ne^{-at}$, where n is the fraction of H₂ consumed at time t , N is a const., and $a = aP_0^{1/2}e^{-b/(1.5a\tau)}$, with a another const. After the max. the rate is given by $da/dt = -(bP_0/n)(1-n)/(1 + [1.5b/(1-1.5a\tau)]^2)$, where b is a const. and n is the initial H₂:O₂ ratio. The expression $(1-1.5a\tau)$ gives the fraction of the initial O remaining unreacted at any time. The temp. coeff. of b corresponded to an activation energy of 18,000 cal. Addn. of N or SO₂ had little effect on the rate. Addn. of traces of H₂ vapor prolonged the induction period, and 1 mm. of H₂ stopped the reaction altogether. Addn. of Cl also inhibited the reaction, presumably because it reacts to form S. A. O. Allen

ASB-15A METALLURGICAL LAB

EXPERIMENTAL MODEL

EXPERIMENTAL MODEL

STANDARD FORM NO. 1

PROJECT AND PROPOSED MODEL

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Forward kinetics of slow oxidation of hydrogen outside. N. M. ... *Adv. Phys. Chem.* 10, 240-274 (1964). The rate of the reaction was followed by pressure change in a conventional glass static system fitted with a membrane-type manometer. The temp. was varied from 240 to 300°, the pressure from 50 to 250 mm., and H₂:O₂ ratios of 1:1, 1:2, and 2:1 were used. The reaction is $H_2 + 1.5O_2 \rightarrow H_2O + 0.5O$. After an induction period, the rate of pressure drop gradually increased to a max., which occurred when the reaction was only 10-15% complete; the reaction dropped slowly. At the end of the induction period, a slight momentary rise in pressure was occasionally seen, too large to be accounted for as a purely thermal effect, but this was not reproducible. The induction periods τ followed the law $\tau/P_0^{1/2} = \text{const.}$, where P_0 is initial pressure and d the diam. of the cylindrical reaction vessel. The accelerating portion of the reaction (before the rate max.) was governed by the exponential law $n = Ne^{-at}$, where n is the fraction of H₂ consumed at time t , N is a const., and $a = aP_0^{1/2}e^{-b/(1.5a\tau)}$, with a another const. After the max. the rate is given by $da/dt = -(bP_0/n)(1-n)/(1 + [1.5b/(1-1.5a\tau)]^2)$, where b is a const. and n is the initial H₂:O₂ ratio. The expression $(1-1.5a\tau)$ gives the fraction of the initial O remaining unreacted at any time. The temp. coeff. of b corresponded to an activation energy of 18,000 cal. Addn. of N or SO₂ had little effect on the rate. Addn. of traces of H₂ vapor prolonged the induction period, and 1 mm. of H₂ stopped the reaction altogether. Addn. of Cl also inhibited the reaction, presumably because it reacts to form S. A. O. Allen

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EXPERIMENTAL MODEL

EXPERIMENTAL MODEL

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Oxidation of hydrogen outside from the point of view of the kinetics of the intermediate reaction products. N. M. Emanuel. *J. Phys. Chem.* (U.S.S.R.) 19, 16-17(1948). — An amplified discussion of the previous results (cf. C.A. 20, 4469) is given. The following "kinetic method" for investigating the intermediate reaction products is worked out. A mixt. of H_2S and 1.5 O_2 is heated ($200-300^\circ$) in a vessel for t_1 sec., transferred into a cooled vessel, kept in it for t_2 sec., and transferred into a third (heated) vessel. The time t_3 is fixed, which the reaction in the 3rd vessel requires to assume the velocity detd. by the vol., temp., and pressure in the third vessel only. The t_1 values are smaller the longer t_2 , and the shorter t_2 , and from the (linear) relations between t_1 and t_2 , and t_1 and t_3 , the rate of formation and the rate of decay of the active transition compd. can be calcd. Spectroscopic observations show this compd. to be SO, which is confirmed by the effect of SO addns. on the reaction kinetics. The energy of activation of the decay of SO is $8500 \text{ cal./g.-mol.}$ Using the "kinetic method" it is shown that water vapor consumes the active SO; the rate of consumption is proportional to the active SO; X's Y, X and Y being the concn. of SO and H_2O , resp. The temp. coeff. of the reaction is neg.; the reaction const. at 0° is $16-20$ times that at 40° . Increase of the glass sur- face in contact with the mixt. does not affect the rate of the reaction. If a reacting $\text{H}_2\text{-O}_2$ mixt. is rapidly cooled in liquid air and then fractionated, its compn. can be exam'd. In the process of reaction the vols. of H_2S dis-

appearing and of H_2O and $(\text{SO} + \text{SO}_2)$ formed are roughly equal, but some H_2 and SO_2 also seems to be produced. The kinetics of the oxidation of H_2S can be accounted for by assuming that the active SO mols. are consumed in the reactions $\text{SO} + \text{O}_2 = \text{SO}_2 + \text{O}$ and $2\text{SO} + \text{O}_2 = 2\text{SO}_2$.

J. J. Birkman

2

CA

Phenomenon of contraction and its application in chemical kinetics. N. M. Emanuel (Inst. of Chem. Phys., Acad. of Sciences of the U.S.S.R.). *Compt. Rend. Acad. Sci. U.S.S.R.* 48, 488-90(1945). The contraction due to assocn. of reaction intermediates when a reaction mixt. is suddenly cooled or released from the confining vessel is discussed as a means of obtaining information on the reaction mechanism. The method applied to the oxidation of H₂S and CH₃CHO demonstrates the existence of SO radicals and the dimerization of AcOH vapor mole.

J. H. Raley

ASB-ELA METALLURGICAL LITERATURE CLASSIFICATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

EMANUEL', Nikolay Markovich

C3.R
C2.R
E8.R
E3.R

Chief of Laboratoriy promezhutochnykh produktov Instituta
khimicheskoy fiziki AN SSSR. In 1948, winner of "Premiya
im. A.N. Bakha" for publication: "Issledovaniye promezhu-
tochnykh produktov gazovykh okislitel'nykh reaktsiy."

Intermediate Products of Complex Gas Chemical Reactions. Moscow: Izdatel. Akad Nauk
SSSR, 1946. 132 p

I-1011

157 200 100
100 200 100

2

The kinetics of sulfur monoxide. V. O. Markovich and M. M. Kuznetsov. (Int. Chem. Phys., Acad. Sci. U.S.S.R., Moscow). J. Phys. Chem. (U.S.S.R.) 21, 1561-62 (1957) (in Russian). To find the mol. wt. of sulfur monoxide (I), 1 ml. of $\text{H}_2\text{S} + 1.5 \text{ O}_2$ was heated (540-550°) in a bomb some 1 and then allowed to escape into a cold vessel or was cooled by immersing the reaction vessel (quartz) in cold water. In both instances, the gas pressure decreased within about 1 min. to values smaller than those due to the cooling of the gas. The adiab. contraction is ascribed to the reaction $2 \text{ SO} \rightarrow \text{S}_2\text{O}_2$. When the reaction between H_2S and O_2 progresses at 100 mm. Hg and 500°, the adiab. contraction increases to a max. (about 4 mm. Hg) and decreases again. This change of the adiab. contraction is very similar to that of the concn. of I. ded. from the absorption spectrum of mixts. of I. + $\text{H}_2\text{S} + \text{O}_2$ cooled to room temp. The characteristic absorption of I is due to S_2O_2 . The spectrum of S_2O_2 is short-lived (less than 15 min.) because of the reaction $\text{S}_2\text{O}_2 \rightarrow \text{SO}_2 + \text{S}$. J. J. Bierman

AD-36 METALLURGICAL LITERATURE CLASSIFICATION
6-27-57-12-100

REGION DIVISION										REGION NUMBER									
CANDID #1										CANDID #2									
1 2 3 4 5 6 7 8 9 10										11 12 13 14 15 16 17 18 19 20									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

CA

Spontaneous ignition of mixtures of acetaldehyde and oxygen with addition of acetyl hydroperoxide. T. E. Pavlovskaya and N. M. Emanuel. *Doklady Akad. Nauk S.S.S.R.* 50, 1003-4 (1947).—Mixts. of AcH with 0.75 moles O were studied at 190° in glass by using pressure variation as a criterion of the reaction. At the point ΔP_m the compn. of the mixt. is AcH 31, AcOOH 21, and AcOH 12 mm. Hg. A bright flash occurs immediately on introduction of the peroxide vapor into the hot mixt. The kinetics of the reaction were studied, but the results are not cited.

G. M. Kosolapoff

B-76875

1ST AND 2ND DEGREE		PROCESSES AND PROPERTIES INDEX		140 AND 1TH (COOL)	
<p>Kinetics of the oxidation of acetaldehyde in the gas phase. I. Z. K. Malina and N. M. Kumanov (Inst. Phys. Chem. Acad. Sci. U.S.S.R., Moscow). <i>Bull. Acad. Sci. U.S.S.R., Class. sci. chim.</i> 1948, 67-68 (in Russian).--Kinetic curves of the pressure change Δp (in mm. Hg) against the time θ (in sec.) were constructed from manometric measurements. The curves have the well-known shape, with Δp decreasing along the 1st stage of the reaction, passing through a min., and then increasing. The magnitude of the pressure drop Δp_c from the start to the min., of the pressure rise Δp_r from the min., and of the time θ_m necessary to reach the min., were detd. as functions of the concn., the temp., and the pressure. (1) In a quartz vessel of 30 cm. diam., at 100°, initial pressure $p_0 = 100$ mm. Hg, mole ratio $\text{AcH}:\text{O}_2 = 1.33$, $\Delta p_c = 17.6$, $\Delta p_r = 15.3$ mm. Hg, $\theta_m = 85$ sec. In the interval 140-240°, p_0 80-300 mm., transition from accelerated to slowed fall of Δp occurs, on the av., at 0.83 Δp_c; the ratio of the max. rate of fall of p and of the initial rate is about 1.75. On the ascending branch, a transition from fast to slow rise of Δp occurs, on the av., at 0.34 Δp_c. Such max. of rate at definite stages of the conversion (in this case, at $1/3$ and $1/4$ on the descending and the ascending branch, resp.) are often indicative of autocatalytic processes. The lower the temp., at const. p_0, the deeper is Δp_c, the slower the subsequent rise, and the lower the Δp_r attained. At const. temp., Δp_c increases with increasing p_0, almost linearly between $p_0 = 180$ and 300 mm., θ_m decreases linearly with increasing p_0; Δp_r increases with p_0. The ratio $\alpha = \Delta p_r/\Delta p_c$ remains const. between p_0 50 and 320 mm. Hg; at 140, 170, and 190°, $\alpha = 2.0$, 1.3, and 1.1, resp. At const. $p_0 = 100$ mm., a temp. rise from 180 to 190° results in a decrease of Δp_c from 24 to 17.5 mm. and an increase of Δp_r from 13.5 to 18 mm.; in glass vessels, the numerical values are somewhat different but the trends remain the same. It being established that the stage of falling Δp corresponds to formation of H_2O_2 and AcOH, and the stage of rising Δp to gaseous products, CO, CO_2, C_2H_4, and H_2O (Dobladý 37, 271 (1947)), the decrease of Δp_c with falling temp. means that, at lower temps., H_2O_2 oxidizes AcH mainly to AcOH, along with secondary processes. With increasing AcH content in the gas mixt., at const. temp. and p_0, both Δp_c and Δp_r first increase, pass through a max. (at about 60°; AcH, at 190° and p_0 100), then decrease; θ_m and α decrease uniformly with increasing AcH. The initial rate of fall of Δp is proportional to the 1st power of the concn. of AcH, in disagreement with findings of previous authors. At a const. initial partial pressure of AcH, 57 mm. Hg, increase of the partial pressure of O_2 from 43 to 123 mm. has no effect on the rate of fall of Δp and leaves both Δp_c and θ_m unchanged but slows down distinctly the rate of rise of Δp and lowers Δp_r. Thus, the cessation of the fall of Δp cannot possibly be due to total consumption of O_2, as presumed by Bordenstein. The activation energy E^- of the 1st stage of the reaction (falling Δp) was calcd. by referring all exptl. Δp_c to that corresponding to 190°, p_0 100 mm., chosen as standard (see 1).</p>					
<p>ASR-11A METALLURGICAL LITERATURE CLASSIFICATION</p>					
<p>140 AND 1TH (COOL)</p>					

and taken = 1, the transformation coeffs. K being defined by $K = \theta/\theta_0$, where θ and θ_0 are the times, in sec., necessary to attain equal $\Delta p^-/\Delta p_0^-$ for the transformed and the standard curves, resp. This leads, assuming Arrhenius dependence of the reaction-rate consts. on the temp., to $E^- = R[\ln(K/\Delta p_0^-) - \ln(K/\Delta p_0^-)] / (1/T_0 - 1/T_1)$. From the exptl. (linear) plot of $\log (100 K/\Delta p_0^-)$ as a function of $(1/T)$, one finds $E^- = 11.7 \text{ kcal./mole.}$ In fair agreement with Bodenstein (C.A. 23, 2000); the all too high value (18.6) of Koler and Neilsen (J. Phys. Chem. (U.S.S.R.) 13, 156(1941)) is explained by the fact that they have taken into account only the temp.

dependence of θ_0 , but have ignored that of Δp_0^- . The value of E^- is independent of the material of the wall of the reaction vessel (quartz or glass). Plots of $\log \theta_0$ against $1/T$, at a given const. compo., θ_0 and wall material, are linear. Assuming the reaction at the initial and beyond it, to be predominantly the 2nd-stage oxidation of AcH by H_2O_2 to gaseous products, the activation energy E^+ for that stage can be calcul. by $\theta_0 \sim e^{E^+/RT}$. The values of E^+ prove to vary with the wall material: for quartz, $E^+ = 17.6$, for glass 20, for quartz freshly rinsed with $\text{CrO}_3 + \text{H}_2\text{SO}_4$, and boiling H_2O , 28 kcal./mole. The greater value of E^+ as compared with E^- explains the weak development of the Δp^- branch at low temps. N. Thon

Kinetics of the oxidation of acetaldehyde in the gas phase. II. E. K. Malen and N. M. Emanuel (Inst. Phys. Chem. Acad. Sci. U.S.S.R., Moscow). *Izv. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1966, 123-23; cf. C.A. 42, 5814b. — Analysis of the elementary compo. of the reaction mixt. at different stages of the reaction were made in two typical cases, at 170° where the kinetic curve consists of a branch of falling pressure, followed by a branch of rising pressure, and at 125° where there is only a fall of pressure; roughly, the dividing temp. between the two types of kinetic curves lies at about 150°, but this has no universal significance and varies with the condition of the reaction-vessel walls; also, it is possible that a rise of pressure might set in eventually, after a sufficiently long time, even at low temps. In the lowest-tem reaction mixt., peroxide was detd. by iodometry, AcHl by the NH_4OH method, acidity by titration, and CO , CO_2 and C_2H_6 by standard gas analysis. Expts. were run in CrO₃-fused glass vessels of 30 mm. diam., with mixts. AcHl + 0.75 O₂, total initial pressure $p_0 = 100$ mm. Hg. In a typical run at 170°, characterized by $\Delta p_1 = 28.4$, $\Delta p_2 = 12.6$ mm. Hg, $t_0 = 167$ sec. (for notation cf. C.A. 42, 5814b), the amt. of AcHl is seen to decrease uniformly throughout the course of the reaction ($\sim 0.7, 20, 100$ mm. Hg at 0, 100, 600 sec.), O₂ is consumed during the Δp_1 stage but then remains unchanged, the amt. of AcOH increases steadily (11, 18, 22 mm. after 20, 100, 600 sec.), and the curve of the amt. of the intermediate peroxide AcO₂H passes through a max. at 2.5 sec. (~ 18 mm. Hg). Along the whole Δp_1 branch, the sum $Z_1 = \text{AcHl} + \text{AcOH} + \text{AcO}_2\text{H}$, in % with respect to the initial AcHl, is always $\sim 100\%$; at Δp_2 , only insignificant amts. of gaseous products (CO , CO_2 , etc.)

were found. Further, along the Δp_1 branch, the change of pressure corresponds quite closely to $\text{AcHl} + \text{O}_2 \rightarrow \text{AcO}_2\text{H}$ and $\text{AcHl} + 1/2\text{O}_2 \rightarrow \text{AcOH}$, $\Delta p = p(\text{AcHl}) + 1/2 p(\text{AcO}_2\text{H})$; there are, however, occasional nonnegligible deviations. Beyond the Δp_1 point, Z_1 sum becomes $< 100\%$; this indicates formation of other products, which is confirmed by analytical detection of significant amts. of CO , CO_2 and C_2H_6 , and, by the difference, H_2O , along the Δp_2 branch. Along this branch, with the O₂ remaining const., the av. expenditure of AcO₂H is 12.7 mm. Hg per 14.6 mm. AcHl, i.e., close to 1 mol. per 1 mol. If the total pressure p_0 of the gaseous products, calcd. by $p_0 = p - Z_1$ (where p = total pressure, $Z_1 = \text{AcHl} + \text{AcOH} + \text{AcO}_2\text{H} + \text{O}_2$ in mm. Hg), at the end of the Δp_1 branch is put = Δp_2 , then the p_0 values at different moments of the Δp_2 stage fall very satisfactorily on the Δp_2 branch curve. Since the main reaction $\text{AcO}_2\text{H} + \text{AcHl} \rightarrow 2 \text{AcOH}$ gives rise to no change of p , the rise Δp_2 is detd. by the reaction $\text{AcO}_2\text{H} + \text{AcHl} \rightarrow \text{C}_2\text{H}_6 + \text{H}_2\text{O} + \text{CO}_2 + \text{CO}$. If so, one must have $p_0 = 2(Z_{\text{max}} - Z_1)$, where Z_{max} is the value of Z_1 at the point Δp_2 ; values of p_0 thus calcd. for various points along the Δp_2 branch (with $Z_{\text{max}} = 75.5$ mm. Hg) coincide very satisfactorily with $p_0 = p - Z_1$, which confirms the above reaction equation. The values of p_0 at the point Δp_2 , calcd. in the 2 ways, 23.8 and 22.0 mm. Hg, are also in agreement with the exptl. sum $\text{CO} + \text{CO}_2 + \text{C}_2\text{H}_6$ at that point, 22.4 mm., plus $1/2$ of it for H_2O , totaling 21.3 mm. At the point Δp_2 , about 50% of the initial AcHl has reacted, in agreement with Pease (C.A. 27, 4187); at Δp_2 , about 25% of the AcHl and 40% of the O₂ remain unreacted. At 125°, the curve of the amt. of AcO₂H still passes through a max. (21.3 mm. Hg at 37

PA 53/49721

USSR/Chemistry - Combustion
Chemistry - Flame

Apr 48

"Progress in Chemical Kinetics and Combustion
Theory," M. M. Emanuel', 5 pp

"Vest Ak Nauk SSSR" No 4

Ya. V. Zel'dovich gave the basis for a method of
selecting the true value of detonation speed
through a consideration of the kinetics of chem-
ical reaction in the front of the detonation
wave. Theoretical works completed in the Inst of
Chem Phys pointed up conclusion that the mecha-
nism of fundamental phenomena in combustion and

53/49721

USSR/Chemistry - Combustion (Contd)

Apr 48

detonation of explosive substances may be under-
stood on the basis of reaction kinetics in the
combustion zone and in the front of the detona-
tion wave plus properties of the substance at
very high pressures and temperatures.

53/49721

EMANUEL', M. M.

PA 62T99

EMANUEL, N. M.

Mar 1948

USSR/Physics
Vapor Pressure
Low Temperature Research

"An Investigation of the Vapor-Phase Reactions of
Substances Having Low Vapor Pressure at Room Temper-
ature," N. M. Emanuel, Inst Phys Chem, Acad Sci
USSR, 2½ pp

"Zavod Lab" Vol XIV, No 3

New method developed to determine vapor-phase re-
actions for substances characterized by low vapor
pressures. Formulas for using data obtained from
apparatus readings.

62T99

111 AND 120 SERIES		PROCESSING AND PROPERTY INDEX	
<p>Phenomena occurring on cooling of reacting mixtures. N. M. Rimberg (Inst. Chem. Phys. Acad. Sci. U.S.S.R., Moscow). <i>Doklady Akad. Nauk S.S.S.R.</i> 99, 1137-40 (1948). Intermediate products accumulating in a reacting mist, can often be detected on rapid cooling. The vol. contraction observed on fast cooling of the active radicals SO₂ is due to recombination of the characteristic 2400-3600 A. bands appear, which thus prove to belong to SO₂, not to SO. Ignition conditions of H₂ + O₂ mixts. having partly reacted ("trained") mixts. are different from those of fresh mixts.; in the case of the trained mixts., explosions are brighter, and there is no induction period. Analogous phenomena are observed in AcH + O₂ mixts.; if the slow oxidation is interrupted by rapid cooling, at a stage when a large amt. of the intermediate Ac₂H₂ has accumulated, and the mist is brought back to the initial temp. or even to a somewhat lower temp., bright inflammation will occur. That this is due to the presence of Ac₂H₂, has been demonstrated directly by the ignition, at the same temp., of artificial mixts. of AcH, O₂, Ac₂H₂, and AcOH. In this case, too, the ignition range of pressure and temp. is broadened, and explosions are brighter and develop higher pressures. The intermediate Ac₂H₂ formed in the reaction chain and which, on cooling, gives the explosive peracetic acid, is possibly the cyclic MeCH₂CO₂CH₂Me, as proposed by Bodenstein (C.A. 23, 2686); why the cyclic form is active only in slow oxidation whereas the stable MeCO₂CH₂CH₂Me causes explosion, is still an open question. As in the case of oxidation of AcH, cooling of partly reacted mixts. of H₂ + O₂ and PrCH₃ + O₂ also given rise to explosion on re-heating, under conditions where "untrained" mixts. will react only slowly. Thus, fresh equimol. mixts. of H₂ + O₂ and PrCH₃ + O₂ under 100 mm. Hg, will give cold flames only at 245 and at 262°, resp., whereas the same mixts., trained by slow oxidation at 200° and cooled rapidly, will ignite when heated again to the same temp. N. Thon</p>		<p>2</p>	
<p>ADDITIONAL LITERATURE CLASSIFICATION</p>		<p>EXPLANATION</p>	
<p>111 AND 120 SERIES</p>		<p>EXPLANATION</p>	

Doc Chem Sci

Emanuel, N. M.

Dissertation: "Investigations in the Field of Intermediate Products of
Gas Oxidation Reactions."

28 November 49

Sci Res Order of the Labor Red Banner Physicochemical Inst imeni L. Ya. Karpov.

CO Vecheryaya Moskva
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EMANUEL, N.M.

1/2

③

Chemical Abst.
Vol. 48 No. 3
Feb. 10, 1954
General and Physical Chemistry

The nature of the chemical manifestation of the hydrogen bond in hydroperoxides of aliphatic acyls. D. G. Kozlov and N. M. Emanuel (Inst. Chem. Phys., Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 28, 425, 17(1952).
In the gas-phase oxidation of aldehydes (Ac I, EtCHO, PrCHO) with O_2 , ignition often takes place several tens of degrees below normal, if the slowly reacting mixt. has been subjected to quenching and then heated up again. This lower ignition temp. is the same as that of an artificial mixt. of aldehyde, O_2 , and the corresponding hydroperoxide. This is proof that the quenching converts the hydroperoxide produced in the slow reaction into an active form, identical with the synthetic hydroperoxide; the activation energy of that conversion was detd. to be 8 kcal. By infrared spectroscopy, the reactive form is characterized by an intramol. H bond. To elucidate further the nature of the hydroperoxide conversion to the active form, equimolar mixts. of EtCHO and O_2 at an initial pressure of 100 mm. were allowed to react at 180° and then quenched; in the initial stages, the drop of the pressure Δp^- is proportional to the amt. of hydroperoxide (I) formed. The temp. t_1 of the low-temp. ignition flash was detd. as a function of the duration τ_q of the quenching, at the const. quenching temp. of 0° and at $\Delta p^- = 10$ mm. (corresponding to 11.0 mm. of I) and 8 mm. (5.8 mm. of I). With short τ_q (up to about 500 sec.) only the orange-colored high-temp. flash, at $t_1 = 235-10^\circ$, is observed; at a sharp τ_q , a blue low-temp. flash sets in at $t_1 = 145^\circ$, and further prolongation of τ_q produces no further change in t_1 . Nor does t_1 change with Δp^- , i.e. it is independent of the concn. of I, and can therefore not be used as an indication of that concn. The "crit. quenching time, τ_{crit} ," i.e. the shortest length of quenching necessary for the mixt. to become capable of low-temp. flash, decreases rapidly as the temp. to which the mixt. is heated up again (after the quenching) is raised; consequently, τ_{crit} is the time necessary to attain a concn. of active I sufficient for low-temp. ignition. The dependence of τ_{crit} on Δp^- , i.e. on the concn. of total I, was detd. with AcI + O_2 mixts. For any given const. quenching temp. (18, 15.5, and 7.7°), the area of the plot of Δp^- as a function of τ_q can be divided into a region of high-temp. and of low-temp. flash. The line

D. G.
Y. NORRE
2/2

sepg. the 2 regions shows that r_{∞} decreases as Δp^- is increased, and is independent of the concns. of aldehyde and O_2 present in the mixt. On the assumption that both the conversion of inactive into active I (rate const. k_1) and the reverse conversion (rate const. k_2) are unimol. reactions, the rate for the partial pressure p_a of the active form is represented by $dp_a/dt = k_1 p - (k_1 + k_2) p_a$ where p is the total partial pressure of I, or integrated, $p_a = [p/(1 + K)] [1 - e^{-(k_1 + k_2)t}]$, where the equil. const. $K = k_2/k_1$. By the definition of r_{∞} , and the proportionality $\Delta p^- = \alpha p_a$, one has, further, $\Delta p^- = B/(1 - e^{-(k_1 + k_2)t})$, with $B = \alpha(1 + K)p_{\infty}$, the last symbol designating the min. p_a necessary for a flash. This relation permits the calcn. of $(k_1 + k_2)$ and of B from exptl. pairs of values of r_{∞} and Δp^- ; for $r_{\infty} = 18^\circ$, $(k_1 + k_2) = 4.7 \times 10^{-3} \text{ sec.}^{-1} (\pm 15\%)$ and $B = 10.0 \text{ mm}$. The agreement of the calcd. and the exptl. curves $\Delta p^-(r_{\infty})$ justifies the assumption that the active \rightleftharpoons inactive conversion is reversible unimol. reaction. At $r_{\infty} = 15.5$ and 7.7° , $1/(k_1 + k_2) = 4.0 (\pm 1.0)$ and $\sim 1.0 \times 10^{-3}$, resp. On the basis of the previously (Malusz, *et al.*, C.A. 44, 4750) estd. heat of conversion, 8 kcal., K should be of the order of 10^{-1} ; with $K = 0.1$ and 0.18 at 10° and at 18° , resp., one finds, at 10° , $k_2 = 1.45 \times 10^{-3}$, and at 18° , $k_2 = 4.0 \times 10^{-3} \text{ sec.}^{-1}$; hence the activation energy $E_2 = 16.5 \text{ kcal./mole}$. Abs. rate-theory calcn. gives a very close value, $E_2 = 17$, and, hence, $E_1 = 25 \text{ kcal./mole}$. Obviously, mere intramol. H bonding cannot have an activation energy of 17 kcal., but H bonding can facilitate the passage of a proton from one atom to another, specifically from the peroxide to the carbonyl O atom. With this assumption, calcn. using the formula of Sokolov (C.A. 42, 8546), with the frequency 3300 cm.^{-1} assigned to the active I, gives an activation energy of 20 kcal., close enough to the above $E_1 = 25$. This corroborates the assumed nature of the conversion of the inactive into active I.

N. Thor

EMANUEL', N. M., Prof.

USSR/Chemistry - Peroxides

• Jun 52

"Is There a Higher Peroxide of Hydrogen?" Prof N. M. Emanuel', K. Ye. Kruglyakova, Inst of Chem Phys, Acad Sci USSR

"Priroda" Vol 41, No 6, pp 103-105

Assumes that the peroxide H_2O_4 exists in aq solns of H_2O_2 , because (1) reaction kinetics show that the number of active centers producing decompn of H_2O_2 (HO_2 radicals that combine to form H_2O_4) is undiminished after chilling and reheating of the soln; (2) the amt of oxygen evolved is less than that which corresponds to the amt of hydrogen

229T23

peroxide decomposed; (3) this discrepancy becomes smaller when the soln has been aged for 1 mo at room temp; (4) evolution of oxygen is delayed after acidulation of CaO_4 with dil acid.

229T23

The chain mechanism of the decomposition of hydrogen peroxide and the existence of HO_2 radicals and of A. B. Bakh's higher hydrogen peroxide. K. E. Kravchenko and N. M. Bimant (Inst. Chem. Phys. Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 85, 882-8 (1982). —The curve of the homogeneous decomposition of catalysts, of dil. aq. solns. of H_2O_2 was followed at 90° in quartz vessels, by the vol. of O_2 evolved, v , and the decomposition of H_2O_2 (by titration). The kinetic curve is S-shaped. The evolution of O_2 lagged behind the decomposition of H_2O_2 ; the defect, Δ , passes through a max. at a relatively early stage of the decomposition. This discrepancy cannot be attributed to a superoxide of the soln. with O_2 . The amt. of the total O_2 evolved on completion of the decomposition, v_∞ , is greater than the vol., v , calcd. from the initial thier of the soln. These discrepancies can be formulated $\Delta = v_\infty - v - [\text{H}_2\text{O}_2]/[\text{H}_2\text{O}_2]_0$, where $[\text{H}_2\text{O}_2]$ is the amt. still present at the moment when the vol. v of O_2 has been evolved and $[\text{H}_2\text{O}_2]_0$ denotes the initial concn. The explanation is that the initial soln. contained, besides H_2O_2 , also some amt. of the higher peroxide H_2O_3 , the existence of which had been suggested by Bakh (*J. Russ. Phys. Chem. Sec.* 29, 373 (1957)). The H_2O_3 titrated as H_2O_2 , but on decomposition, it creates more O_2 than does H_2O_2 . In the course of the reaction, HO_2 radicals are formed, and accumulate, through the reaction $\text{OH} + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{HO}_2$; when the soln. is cooled for titration, the HO_2 radicals associate into H_2O_3 . The max. of Δ indicates considerable accumulation of HO_2 radicals at a certain stage of the reaction, $[\text{HO}_2] = 2\lambda$. This accumulation is borne out by the S-shape of the kinetic curve. Typical of branching-chain reactions. The high accumulation of the HO_2 radicals is possible on account of their relatively low activity. The S-shape of the kinetic curve is not altered if the amt. Δ is added to the expd. v ; consequently, there can be no question of consecutive reactions with O_2 being held in an intermediate product, and then released upon its decomposition. The conjecture that H_2O_3 can dissociate into HO_2 and vice versa, was borne out by experiments in which the reaction mixt. was "quenched" at a certain stage, and then thawed out again; the kinetic curve shows no discontinuities at such points, but, when thawed out, the reaction continues at the same rate at which it was frozen. The HO_2 radicals are then shown to be "convertible" in the soln. for a long time, evidently in the stable form of H_2O_3 . The initial rate of decomposition of a H_2O_2 soln. is greater, the higher is its initial H_2O_3 content. Solns. of the same concn., but differing in age (counted from the date of the H_2O_2), decompose at different rates. A soln. one month older decomposed faster than a fresh soln. of the same concn. (0.8%), owing to its higher H_2O_3 content, produced by recombination of HO_2 radicals formed by very slow decomposition. Acceleration of the decomposition of H_2O_2 was obtained also by a peroxide formed in the reaction between mol. O_3 and at. H (produced in a gas-liquid discharge). This peroxide is identical with H_2O_3 , and its formation is represented by $\text{H} + \text{O}_3 \rightarrow \text{M} - \text{HO}_2 + \text{M}$ ($\text{M} = 3\text{rd body}$). This radical reacts primarily not according to $\text{HO}_2 + \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$, but according to $\text{HO}_2 + \text{HO}_2 \rightarrow \text{H}_2\text{O}_3$. The decomposition of H_2O_2 was accelerated also by the peroxide obtained by passing a H flame through a trap cooled with liquid N_2 . This peroxide, formed close to the 3rd ignition limit, should contain significant amts. of HO_2 .

N. Thoms

USSR/Chemistry - Oxidation Catalysts, 11 Apr 52
Reaction Kinetics

"Homogenous Catalysis of Reactions of Hydrocarbon Oxidation," Z. K. Mayzus, N. M. Emanuel', Inst of Chem Phys, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXIII, No 5, pp 717-720

Detd the kinetics of oxidation in propane - O_2 in the absence of catalysts; of oxidation in propane - O_2 in the presence of Br_2 ; of the combined oxidation of propane with O_2 and formation of HBr from H_2 and Br_2 ; of the reaction in propane - O_2 in the presence of Cl_2 ; of the reaction in propane - O_2

218710

USSR/Chemistry - Oxidation Catalysts, 11 Apr 52
Reaction Kinetics (contd)

in the presence of HCl; of the reaction in propane - O_2 in the presence of nitrogen oxides (NO_2). Under the combined action of NO_2 and HCl, the character of kinetic curves typical for NO_2 is preserved, but there is acceleration of the reaction due to the addnl quantity of catalyst that is available.

218710

EMANUEL', N. M.

C3e.R

C3.R

C2.R

E3.R

E4.R

EMANUEL', N. M. and MAYZUS, Z. K.

Date: July 15, 1952

Affil.: Institut Khimicheskoy Fiziki Akademii Nauk SSSR.

Public.: Kinetika katalizirovannoy bromistym vodorodom
reaktsii okisleniya propana.

Source: Doklady Akademii Nauk 87, 2, 1952, pp. 241-244.

Note: Presented by the member of the Academy of Sciences.
N. N. Semenov on Sept. 16, 1952.

P-5043

C3e.R

C3.R

C2.R

E3.R

E4.R

EMANUEL, N. M., and

MAYZUS, Z. K.

Date: July 15, 1952

Affil: Institut Khimicheskoy Fiziki Akademii Nauk SSSR.

Public: Yavleniye predel'noy kontsentratsii atsetona i dokazatel'stvo sushchestvovaniya nachal'noy initsiiruyushchey reaktsii pri okislenii propana v prisutstvi NBr.

Source: Doklady Akademii Nauk 87, 3, 1952, pp. 437-440.

Note: Presented by the member of the Academy of Sciences N. N. Semenov on July 17, 1952.

P-5044

EMANUEL, N. M.

British Abst.

A I

Aug. 1953

Chemical Equilibria and Kinetics

Kinetics of the initiating reaction and properties of the intermediate catalyst in the oxidation of propane in the presence of HBr . Z. K. MAIZUS and N. M. EMANUEL (*C. R. Acad. Sci., U.R.S.S.*, 1952, 87, 801-803).—Experiments are designed to elucidate the kinetics of the formation of an intermediate catalyst of unknown composition in the oxidation of propane. Rates of the initiating reaction, during which the formation of the intermediate catalyst takes place, are determined at 90°, 110°, 130°, 150°, and 170°. The higher the temp., the faster is the initiating reaction, and the greater is the amount of the catalyst formed. At 170° the initiating stage lasts just over one min., whilst the formation of COMe_2 as a result of chain reaction proceeds for about 60 min. At lower temp. the yields of the catalyst and COMe_2 are lower and the chains of the reaction of COMe_2 formation are shorter. The energy of activation of the initiating reaction is 13.5 kJ-cal. per g.-mol. which explains the ease with which the reaction takes place at comparatively low temp. The rates of decomposition of the intermediate catalyst calculated from the rate constant of COMe_2 formation compare well with the rates determined experimentally.

S. K. LAHOWITZ

MF
9-14-54

EMANUEL', N.M., doktor khimicheskikh nauk, professor.

Chain chemical reactions. Nauka i zhizn' 20 no.11:21-24 N '53.

(MLBA 6:11)

(Chemical reactions)

1. EMANUYE', N.M. (Prof.)
2. USSR (600)
4. Chemical Reactions
7. Study of a chemical process, Priroda 42 no. 5, 1953.

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953, Uncl.

"APPROVED FOR RELEASE: Thursday, July 27, 2000

CIA-RDP86-00513R00041211

Emanuel, N.M.

APPROVED FOR RELEASE: Thursday, July 27, 2000

CIA-RDP86-00513R00041211

KNORRE, D.G.; EMANUEL', N.M.; SEMENOV, H.N., akademik.

Effect of the intramolecular hydrogen bond on the reactivity of salicylaldehyde. Dokl.AN SSSR 91 no.5:1163-1166 Ag '53. (MLHA 6:8)

1. Akademiya nauk USSR (for Semenov).

(Salicylaldehyde)

EMANUEL, N.M.

JSSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 20/40

Authors : Knorre, D.G.; Maykus, Z.K.; and Emanuel', N.M.

Title : Initial macroscopic stage of catalyst conversions during oxidation of n-decane in the presence of $\text{Mn}(\text{C}_{11}\text{H}_{23}\text{COO})_2$

Periodical : Dok. AN SSSR 99/3, 415-418, Nov 21, 1954

Abstract : The kinetics of oxidation of n-decane in liquid phase in the presence of $\text{Mn}(\text{C}_{11}\text{H}_{23}\text{COO})_2$, was investigated. It is shown that Mn, Co and some other salts of higher fatty acids, which are soluble in hydrocarbons, accelerate the oxidation of these hydrocarbons. This oxidation acceleration was found to be closely connected with the additional formation of free radicals which takes place during the reaction of metal ions with hydrogen peroxides. The initial macroscopic stage of catalyst conversions, observed during catalytic oxidation of n-decane with $\text{Mn}(\text{C}_{11}\text{H}_{23}\text{COO})_2$, is connected with the changes in the valent state of the Mn. Five references: 4-USSR and 1-Dutch (1947-1954). Graphs; drawing.

Institution : Academy of Sciences USSR, Institute of Chemical Physics

Presented by : Academician N.N. Semenov, May 8, 1954

EMANUEL N.M.
HALBANDYAN, A.B., professor, redaktor; *EMANUEL, N.M.*, professor, redaktor;
CHEREDNICHENKO, V.M., redaktor; *ZELENKOVA, I.G.*, tekhnicheskij redak-
tor

[Chain reaction of gaseous phase oxidation of hydrocarbons] TSepnye
reaktsii okisleniya uglevodorodov v gazovoi fase. Moskva, 1955. 209 p.
(MLRA 9:1)

1. Akademiya nauk SSSR. Institut khimicheskoy fiziki
(Hydrocarbons) (Oxidation)

NAGIYEV, M.F.; TOPCHIYEV, A.V., akademik, redaktor; ~~EMANUEL~~, N.M., doktor khimicheskikh nauk, redaktor; ~~ZHELEKOVA~~, I.S.V., tekhnicheskii redaktor

[Chemistry, technology and computation of the processes of synthesis in motor fuels] Khimiia, tekhnologiya i raschet protsessov sinteza motornykh topliv. Moskva, Izd-vo Akademii nauk SSSR, 1955. 542 p. (MLRA 8:7)

(Motor fuels)

EMANUEL', N.M.

KONDRAT'YEV, V.N., akademik, redaktor; EMANUEL', N.M., doktor khimicheskikh nauk, redaktor; SHIVCHENKO, G.N., ~~tekhnicheskyy~~ redaktor.

[Problems of chemical kinetics, catalysis and reactivity] Voprosy khimicheskoi kinetiki, kataliza i reaktsionnoi sposobnosti; doklady k Vsesoiuznomu soveshchaniyu po khimicheskoi kinetike i reaktsionnoi sposobnosti. Moskva, Izd-vo Akademii nauk SSSR, 1955. 884 p. [Microfilm] (MIRA 8:5)

1. Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.
(Chemical reaction) (Catalysis)

Emanuel' N.M.

USSR/Kinetics- Combustion. Explosions. Topochemistry. Catalysis. B-9

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18563

Author : Z.K. Mayzus, N.M. Emanuel'

Inst : Academy of Sciences of USSR.

Title : Homogeneous Gas Catalysis by Hydrogen Bromide in Reaction of Propane Oxidation.

Orig Pub : in the symposium Tsepnyye reaktsii okisleniya uglevodorodov v gazovoy faze, M., AN SSSR, 1955, 81-117.

Abstract : A more complete account of earlier published results of work. (Dokl. AN SSSR, 1952, 87, 241, 437, 801; RZhKhim, 1955, 7173).

Card 1/1

- 234 -

✓ Hydrogen bonds in chemical reaction kinetics. D. G. Klotz and M. M. Klotz. *Physical Chem. Reviews*, 1955, 100-101; cf. *C.A.* 49, 12002c. The H bond X...H...Y indicates a noticeable interaction between H and Y with a weakening of the X-H bond, as proved by a lowering of the characteristic X-H vibration frequency whenever a H bridge is formed. The H bond may, accordingly, be considered a partial migration of H from X to Y. An attempt is made to systematize the information available in the literature on chem. manifestations of the H bond, and to show its existence in many very different reactions, and how it can become manifest in the different reaction types. The H bond significantly affects the chem. kinetics in a no. of reactions. The intramolecular H bond of the reacting substances with the solvent may play an important role in reactions in soln. It may even be that such bonds det. the effect of solvent on reaction velocities. W. M. Sternberg

E. M. EMANUEL, N. M.
USSR/Physical Chemistry / Kinetics, Combustion, Explosions, Topo-
chemistry, Catalysis.

B-9

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7210.

Author : I.V. Berezin, Ye. T. Denisov, N.M. Emanuel.

Inst : Academy of Sciences of USSR.

Title : Kinetics and Chemism of Cyclohexane Oxydation in Liquid Phase
by Oxygen from Air under Pressure.

Orig Pub: in symposium: Vopr. khim. kinetiki, kataliza i reaktsionnoy
sposobnosti, M., izd-vo AN SSSR, 1955, 273-291.

Abstract: Cyclohexane (I) oxidation was carried out with O_2 from the air
in an autoclave installation at temperatures from 135 to 155°
and under the pressure from 10 to 100 atm. During the reaction
course, samples were taken and analyzed for cyclohexanone (II),
cyclohexanol (III) and cyclohexyl peroxide (IV) contents, and
the total contents of acids (V) and esters (VI); waste gases
were analyzed for O_2 and CO_2 . The oxidation reaction of I has

Card : 1/4

-12-

USSR/Physical Chemistry - Kinetics, Combustion, Explosions, Topo-chemistry, Catalysis.

B-9

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7210.

other intermediate products responsible for the self-acceleration of I oxidation. The study of the IV dissociation showed that it proceeded at 135° in a steel autoclave according to the first order with constants of 0.48 hour⁻¹ (0.39 M in pure I), 0.52 hour⁻¹ (0.06 M of IV + 0.2 M of II), and 0.6 hour⁻¹ (in oxidized I medium) and produced an equimolecular mixture of II and III. The authors assume that the main amount of II is produced by the dissociation of the hydroperoxide radical, and that III is obtained at the expense of the recombination of the hydroperoxide radical with OH with the liberation of O₂. IV decomposes with formation of caprone and -oxycaprone aldehydes, which oxidize at a great rate to corresponding acids. The formation of adipic acid, (VII), the final reaction product,

Card : 3/4

-14-

USSR/Physical Chemistry - Kinetics, Combustion, Explosions, Topo-chemistry, Catalysis.

B-9

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7210.

basically proceeds through the formation of II hydroperoxide and its following decomposition to semialdehyde of adipic acid, which oxidizes to VII.

Card : 4/4

-15-

EMANUEL', N.

USSR/Chemical Technology - Chemical Products and Their I-25
Application. Fats and Oils. Waxes. Soap. Detergents.
Flotation Reagents

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 13764

Author : Emanuel' N., Knorre D., Lyaskovaskaya Yu., Plul'skaya V.

Title : Accelerated Kinetic Method for Testing the Stability of
Food Fats

Orig Pub : Myasnaya industriya SSSR, 1955, No 5, 44-48

Abstract : A method is recommended which is based on the use of
elevated temperature. The work was concerned with deter-
mination of increase in peroxide value with lapse of
time. Different samples of fat showed practically the
same energy of activation of the oxidation process. It
was ascertained that in the course of production treat-
ment of fat change takes place which determines the rate
of its deterioration on storage, and which are not re-
vealed by chemical analysis. Rendering of fat in vacuum
enhances its stability.

Card 1/1

- 379 -

EMANUEL', N., doktor khimicheskikh nauk; KNORRE, D., kandidat khimicheskikh nauk; LYASKOVSKAYA, Yu., kandidat tekhnicheskikh nauk; PIUL'SKAYA, V., inzhener.

The use of butyloxyanisele for improving the keeping quality of edible fats. Mias.ind.SSSR. no.6:47-49 '55. (MLRA 9:2)

1.Institut khimicheskoy fiziki Akademii nauk SSSR (for Emanuel', Knorre), 2.Vsesoyuznyy nauchno-issledovatel'skiy institut vyasnoy promyshlennosti (for Lyaskovskaya, Piul'skaya).
(Oils and fats, Edible) (Anisele)

EMANUEL, N. M.

AID P - 2755

Subject : USSR/Chemistry
Card 1/1 Pub. 119 - 3/6
Authors : Knorre, D. G. and Emanuel', N. M. (Moscow)
Title : Role of hydrogen bond in the kinetics of chemical reactions
Periodical : Usp. khim. 24, 3, 275-301, 1955
Abstract : The effect of hydrogen bond on the course of various chemical reactions is discussed, such as oxidation-reduction processes, formation of complexes, oxidation of aliphatic aldehydes, tautomeric transformations, reactions of hydroxy benzoyl aldehydes with carbonyl compounds, ionization of phenols, and ring formation. Four tables, 7 diagrams, 55 references (20 Russian: 1938-1953)
Institution : None
Submitted : No date

EMANUEL¹, N.M., doktor khimicheskikh nauk.

Problems of chemical kinetics, catalysis, and reaction capacity
(Moscow conference). Vest. AN SSSR 25 no.10:90-94 0 '55.
(Chemistry, Physical and theoretical) (MLRA 9:1)

CIA-RDP86-00513R00041211

CIA-RDP86-00513R00041211C

✓ Use of butylhydroxyanisole for increasing the stability of edible fat. N. M. Emanuel, D. G. Knorre, Ya. Lyashovskaya, and V. P. Piskur. *Myunraya Ind. S. S. R.* 26, No. 6, 47-9 (1955).—A mixt. of the 2- and 3-isomers of *tert*-butyl-4-hydroxyanisole was synthesized and tested on lard made from leaf fat tissue. The mixt. in 0.01% concn. was effective over a wide range of temp. M. M. Piskur

(3)

E. MANUEL, N. M.

USSR/ Chemistry - Conferences

Card 1/1 Pub. 147 - 21/21

Authors : Emanuel', N. M.

Title : Conference on chemical kinetics, catalysis and reactivity

Periodical : Zhur. fiz. khim. 29/10, 1924-1934, Oct 1955

Abstract : Minutes are presented from the special session held in Moscow, USSR during June 20-24, 1955, where problems of chemical kinetics, catalysis and reactivity were discussed in the presence of more than 550 delegates.

Institution :

Submitted :

EMANUEL', N. M.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 30/50

Authors : Mayzus, Z. K., and Emanuel', N. M.

Title : Cold flames of acetaldehyde-oxygen mixtures in the presence of HBr

Periodical : Dok. AN SSSR 100/1, 115-118, Jan. 1, 1955

Abstract : A chemical analysis was made of reacting acetaldehyde-oxygen mixtures at different temperatures immediately prior to the fulmination. The organic hydrogen peroxide usually found in large quantities during the oxidation in the absence of HBr was not discovered in the reaction mixture prior to the fulmination. It was found that the fulmination is in no way connected with the accumulation of organic peroxide in the system. The fulmination rather displays the characteristics of a cold flame which is connected with the accumulation of organic peroxides in the critical concentration. The origin of the thermal fulmination in the chemically reacting system is explained. Five references: 4 USSR and 1 English (1940-1953). Graph.

Institution:

Presented by: Academician V. N. Kondratyev, July 6, 1954

USSR/ Chemistry - Physical chemistry

Card 2/1 Pub. 22 - 29/51

Authors : Knorre, D. G.; Mayaus, Z. K.; and Esamuel', N. K.

Title : The characteristics of the catalytic effect of $\text{Co}(\text{C}_{11}\text{H}_{23}\text{O}_2)_2$ during oxidation of n-decane

Periodical : Dok. AN SSSR 101/5, 895-897, Apr 11, 1955

Abstract : Investigation was conducted to determine the initial macroscopic conversion phase of a Co ($C_{11}H_{23}OCO$)₂ catalyst during the reaction of n-decane. The relation between rate and time was determined. A linear relationship was found.

literature affects the rate of β -decay. Literature on this subject is reviewed. Experimental results are described. Five references: 3 USSR, 1 Dutch and 1 USA (1946-1954). Graphs.

Institution : Acad. of Sc., USSR, Inst. of Chem. Phys.

Presented by: Academician V. N. Kondratyev, November 20, 1954

USSR/ Chemistry - Oxidation

Card 1/1 Pub. 22 - 37/62

Authors : Emanuel', N. M.

Title : The decisive role of the initial period of chain liquid phase reactions activated with gaseous catalysts

Periodical : Dok. AN SSSR 102/3, 559 - 562, May 21, 1955

Abstract : The oxidation of n-decane with oxygen in the presence of HBr was investigated at 110° to determine the importance of the initial period of liquid phase chain reaction activated by gaseous catalysts in the total oxidation process. It was found that the liquid-gas-catalyst system in the composition of the gaseous phase is highly suitable for activation of the initial period because after a certain time lapse the feeding of the gaseous catalyst may become very difficult. It is pointed out that the initiation

Institution : Acad. of Sc., USSR, Inst. of Chem. Phys.

Presented by: Academician N. N. Semenov, February 28, 1955

SEMEKOV, N.N.; EMANUEL', N.M.

Scientific research in the Department of Chemical Kinetics. Uch.zap.
Mosk.un. 174:283-293 '55. (MLRA 9:7)
(Chemical reaction, Rate of)

EMANUEL', N. M.

Tsepyye Reaktsii (Chain Reactions) by Prof N. M. Emanuel',
Doctor of Chemical Sciences, Znaniye, Moscow, 1956, 46 pp

After pointing out that the concept of chain reactions and the kinetics of these reactions have acquired increased importance as the result of nuclear energy developments, N. M. Emanuel' discusses the nature of chain reactions occurring in chemical processes and nuclear fission and briefly outlines USSR work on the kinetics of chemical chain reactions, mentioning results obtained by N. N. Semenov, A. N. Terenin, V. N. Kondrat'yev, V. V. Voyevodskiy, F. F. Vol'kenshteyn, V. A. Kargin, S. M. Medvedev, and others.

In the section on the regulation of chemical chain processes (pp 16-30) the action of chemical inhibitors and the wall effect are discussed. The generation of radicals at the wall is illustrated by results of work done at the Institute of Chemical Physics by A. A. Koval'skiy and Bogoyavlenskaya, who found that the reaction of SO_2 with CO proceeds within the volume of the vessel, although it takes place only in the presence of solid Al_2O_3 , at the surface of which radicals are formed. Following this, homogenous heterogeneous reactions (i.e., reactions which take place both at a surface and in a volume) are mentioned with reference to the fact that work on such reactions is being done by M. V. Polyakov at Kiev.

Regulation of chemical reactions in the gas phase by means of control rods made of stainless steel, tungsten, platinum, graphite, or other materials is described on the basis of work done by Prof A. B. Nalbandyan and S. M. Shubina. According to the description, the reactions can be slowed down or interrupted by inserting the rod or accelerated and restarted by withdrawing the rod.

Procedures for starting reactions with the aid of chemical initiators are then discussed with particular attention to work on the subject done by Emanuel' and his collaborators. The advantages of gas-initiated reactions are illustrated on the example of the liquid-phase oxidation of butane to acetic acid and methylethylketone at a temperature of 135° instead of the 300-400° required for ordinary oxidation in the gas phase. Nitrogen dioxide is used as the initiator. In the final part of the section on the regulation of chemical chain reactions, the use of initiators, inhibitors, and temperature regulation to conduct the reaction at the desired macroscopic stage (and thus to control the composition and yield of the final products and prevent explosions) is discussed. The data pertaining the macroscopic stages of chain reactions are based on work by Emanuel' and Z. K. Maykus.

In the section on nuclear chain reactions (pp 30-36), the author gives an elementary exposition of chain reactions taking place in nuclear reactors and describes an experimental graphite-moderated reactor. In describing the use of reactor control rods made of cadmium, boron steel, or boron carbide, he compares them with the control rods used for the regulation of chemical reactions in experimental work.

In the section dealing with the action of penetrating radiations on chemical chain reactions (pp 37-39), Emanuel' describes his own experimental results on the initiation of the oxidation of paraffin with gamma-radiation emitted by Co^{60} . Air was blown through the paraffin and irradiation with the use of a source having an activity of 4.3 curies was continued for one hr 10 min. As a result of the effect of gamma-radiation, the reaction, which otherwise develops within 370 hr, was started at a fast rate in 12 hr. The author says that the most promising application of radiation in the initiation of chemical reactions is the stimulation of the oxidation of liquefied gaseous hydrocarbons at temperatures close to the critical.

The following section (pp 39-41) deals with the application of tracer atoms in the investigation of the mechanism of chemical chain reactions. As an example of this type of application, work by M. B. Neyman and others on the oxidation of propylene with a C^{14} atom in the 2-position is described. This work was conducted at the Institute of Chemical Physics, Academy of Sciences USSR. As another example of the investigation of chemical reactions with the aid of radioactive carbon, work at Moscow University on the oxidation of cyclohexane to adipic acid is mentioned.

[Comment: The regulation of combustion by means of control rods, direction of chemical reactions into the desired channels with the aid of initiators and inhibitors, and initiation of chemical reactions with penetrating radiation appear to be promising lines of research from the standpoint of eventual practical applications. USSR research on the kinetics of oxidative chain reactions, which is reviewed in this instance by a prominent worker in this field, has an important bearing on developments pertaining to the combustion of fuels and to the formulation and performance of propellants.]